



THE IMPACT OF TECHNOLOGY ON LEARNING ENVIRONMENTS

ANSHEN+ALLEN+LA

SHEPLEY BULFINCH RICHARDSON AND ABBOTT

OUTLINE

- **Introduction: What Architects do**
- **The work of this session: to ask questions about the impact of web assisted technology on learning environments**
- **Topic One :**
Collaborative Learning Environment
- **Topic Two :**
Customized Learning Environment
- **Topic Three :**
Student-Centered Learning Environment

Program / Design / Curriculum

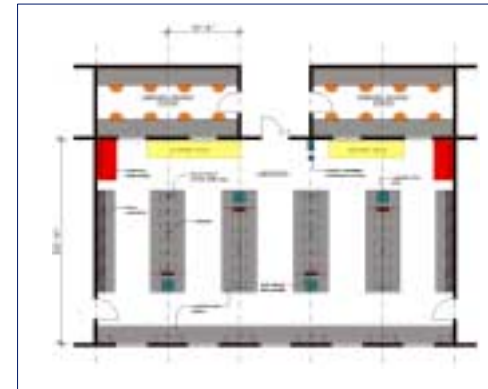
Architect's Role

- Bring people together
- Help define goals & mission for project
- Present case studies that benchmark curriculum concepts
- Discover new approaches to design of learning space
- Encourage participants to lead similar explorations at their institutions

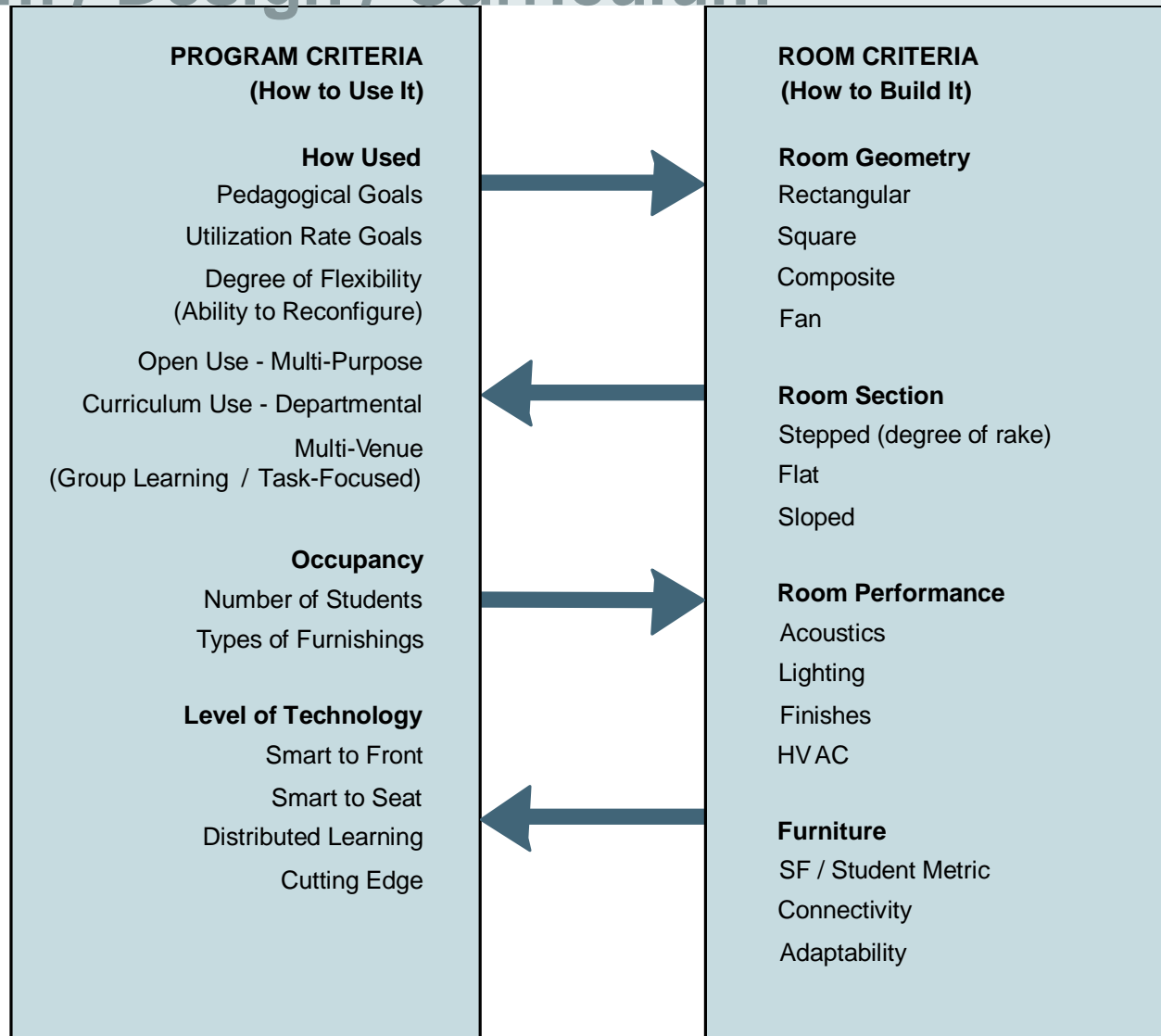


Frank Lloyd Wright and his apprentices,
1938

Program / Design / Curriculum

[illegible]

Program / Design / Curriculum



Program / Design / Curriculum

Traditional Classroom Models

- Formally Organized
- Lecture Based
- High Room Utilization
- Low Room Adaptability
- High Student / Furnishings / Space Ratio



* "Wow," said Lilly. That was just about all she could say. "Wow."



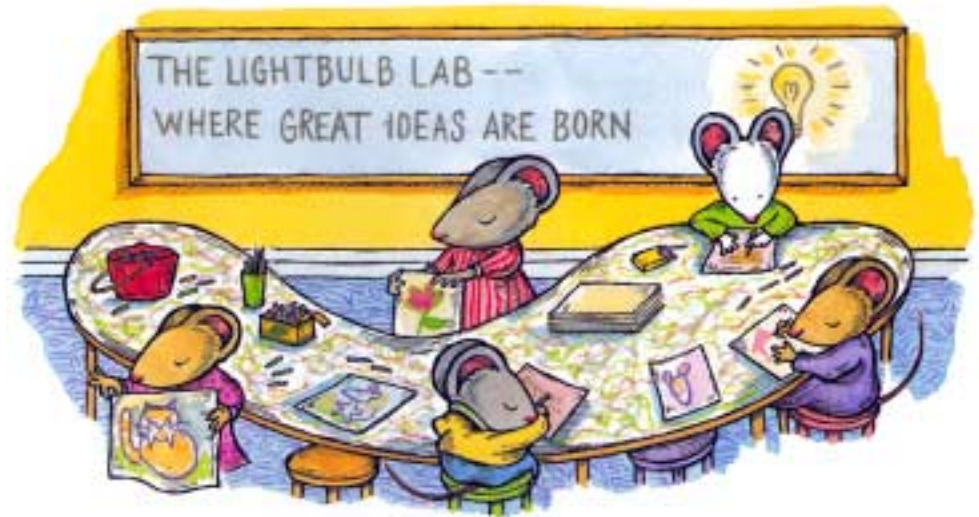
* Photo courtesy of "Lily's Purple Plastic Purse"

- Choice in Learning Spaces

Program / Design / Curriculum

New Classroom Models

- Group Learning
- Multi-Venue
- Lecture and Discussion
- Lower Room Utilization
- Lower Student / Furnishings / Space Ratio
- Higher Room Adaptability



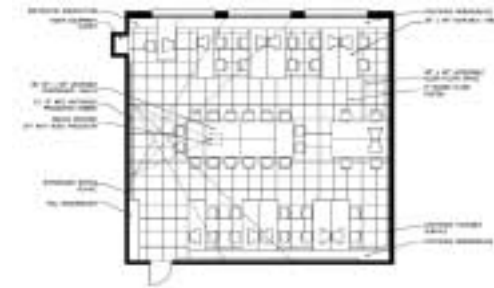
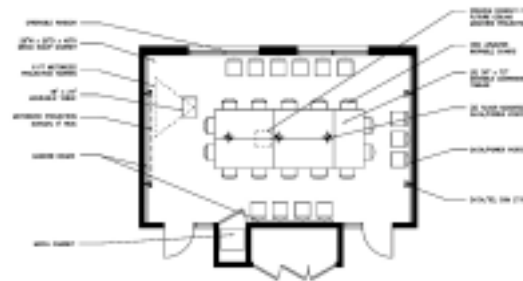
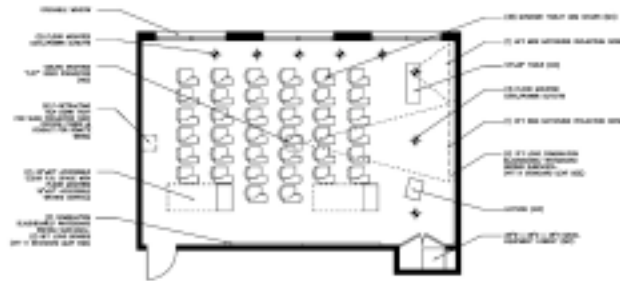
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* Photo courtesy of "Lily's Purple Plastic Purse"

- Choice in Learning Spaces

Program / Design / Curriculum - Learning Space Types



Classroom

- 25 - 75 seats
- Flat floor
- Tablet arm - 16sf / student
- Table / Chair - 21sf / student
- Open use

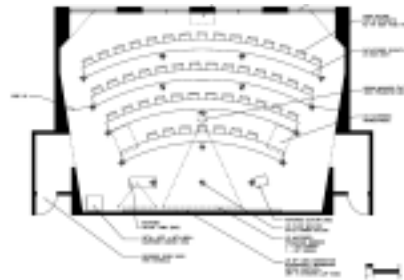
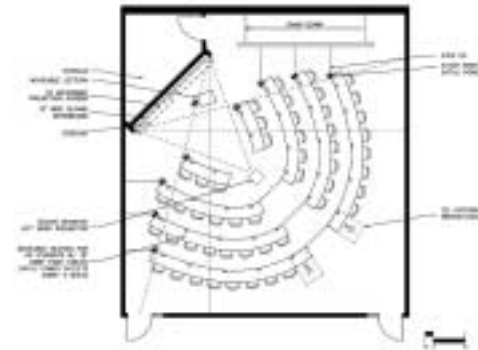
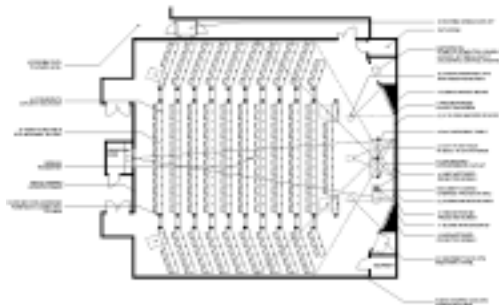
Seminar Room

- 15 - 25 seats
- Flat floor
- Nested Table / Chair - 20sf / student
- Conference Table / Chairs - 23sf / student
- Open use

Skills Classroom - Multi-Venue

- 15 - 25 seats
- Flat floor
- Perimeter Computer Workstations / Central Conference - 50sf / student
- Curriculum use

Program / Design / Curriculum - Learning Space Types



Lecture Hall

- 75 - 350 seats
- Stepped / sloped floor
- Tablet arm - 15sf / student
- Table / Chair - 20sf / student
- Open use


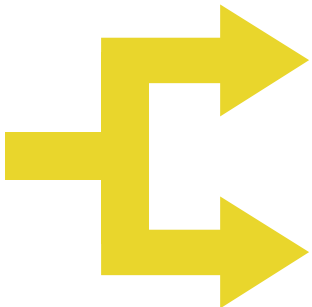
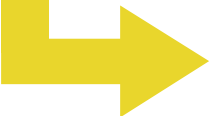
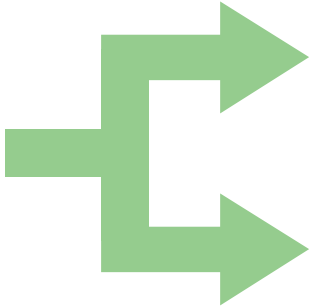
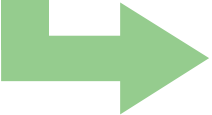
Caseroom

- 50 - 120 seats
- Table / Chair - 27sf / student
- Stepped floor
- Curriculum use

Discussion Classroom

- 35 - 75 seats
- Table / Chair - 25sf / student
- Stepped floor / sloped floor
- Curriculum use

Program / Design / Curriculum - The Technology Metric

Technology Level	Room Implications
Cutting Edge 	<ul style="list-style-type: none">• Shell Space until Systems Identified.• Provide enhanced Power & HVAC.• Furniture: Expect limited flexibility.
Connected 	<ul style="list-style-type: none">• Significant Technology impact.• Requires special lighting / room control.• Furniture: Fixed, minimum flexibility.
Connected 	<ul style="list-style-type: none">• Technology impact throughout room.• No special lighting / room control.• Furniture: Limited by outlet locations.
Wireless 	<ul style="list-style-type: none">• Technology impact limited to Presenter.• Requires special lighting / room control.• Furniture: Flexible, except Presenter.
Wireless 	<ul style="list-style-type: none">• Minimal technology impact.• No special lighting / room control.• Furniture: Maximum Flexibility.

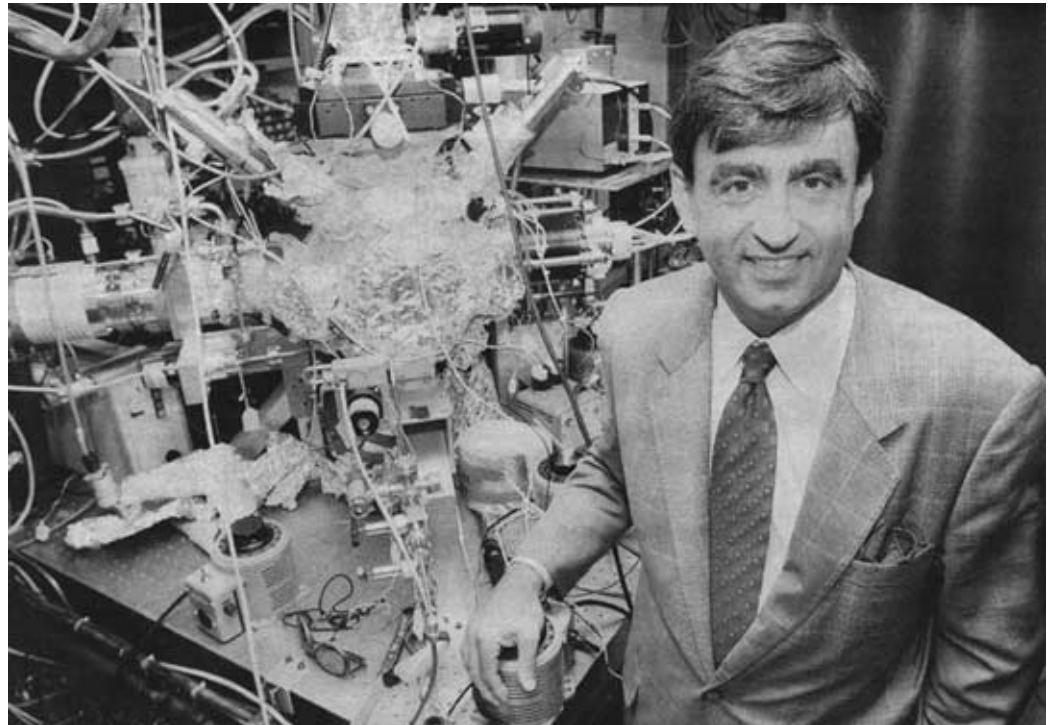
Program / Design / Curriculum - Wireless Classroom



What is Collaborative Learning?

Peer Instruction

The teacher asks questions in the classroom, and gives students time to discuss possible answers. Students vote on the answers with the help of a handheld device. The students confer in small groups before voting on the answer, which has proved to be a valuable tool for learning.



"I consider myself a coach more than a teacher"
Eric Mazur, physicist, named 'distinguished scholar'
by the National Science Foundation for his
development of Peer Instruction

Collaborative Learning

Where does “peer instruction” take place?

Historical places

Lavoisier's Laboratory -1787

Liebig's Teaching Laboratory - 1842

Edison's Main Laboratory-1879

Contemporary places

Classroom, Seminar, Lecture Hall

Research and Teaching Labs

New group learning places

Mixed Use Buildings

Technology Commons

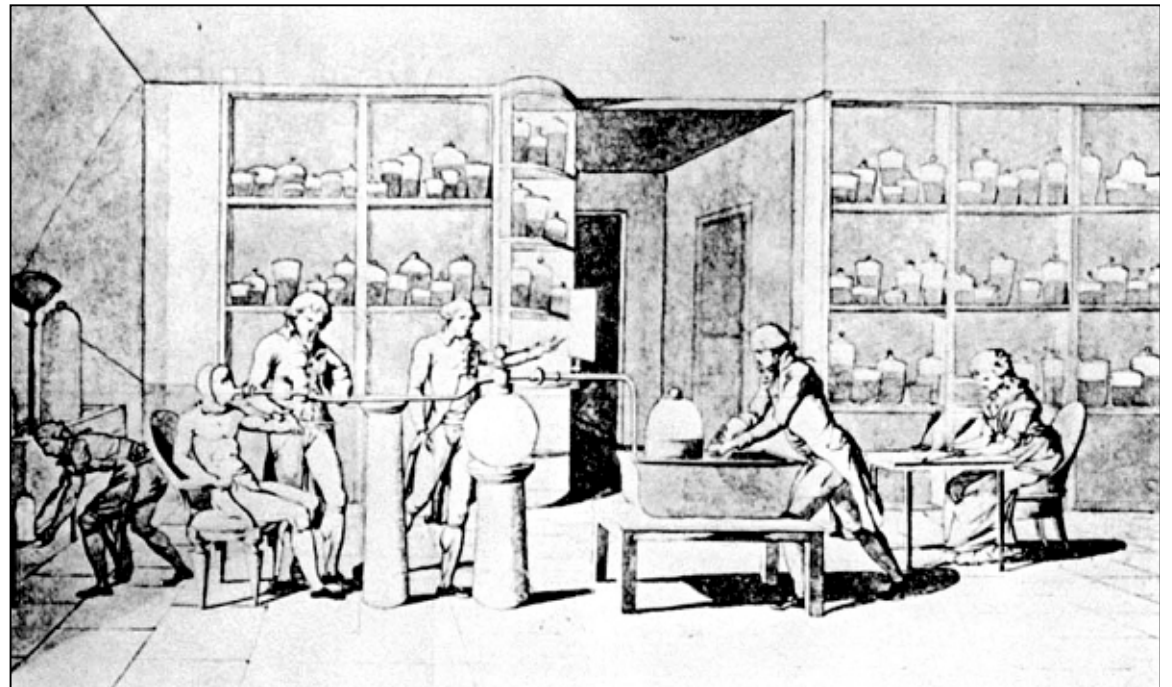
The Media Center

Collaborative Learning Environment

Where did peer instruction take place in the past?

The Research Lab

Lavoisier's Laboratory - 1787



Collaborative Learning Environment

Where did peer instruction
take place in the past?

The Teaching Lab

Liebig's Teaching Laboratory -1842



Collaborative Learning Environment

Where did peer instruction
take place in the past?

The Research Lab

Edison's Laboratory- 1879



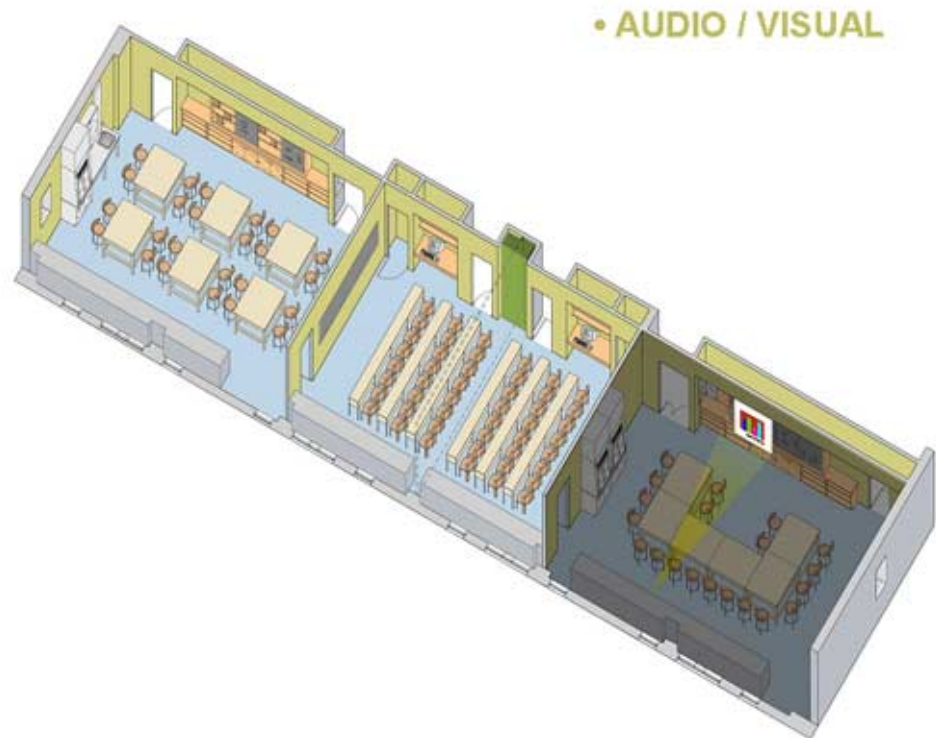
Collaborative Learning Environment

Where does web assisted peer instruction take place today?

The Classroom

Design Considerations

- Flexible walls
- Movable furnishings
- Portable technologies



Agnes Scott College, Georgia

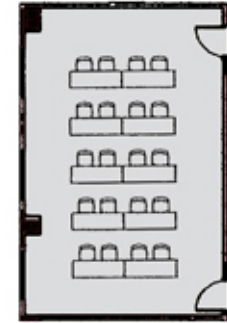
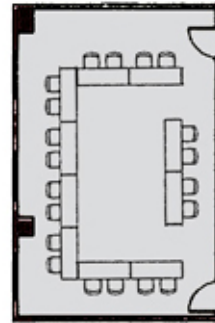
Collaborative Learning Environment

Where does web assisted peer instruction take place today?

The Classroom

Design Considerations

Movable furnishings
Portable technologies



Bates College, Maine



Collaborative Learning Environment

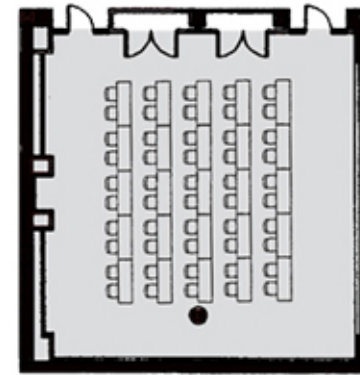
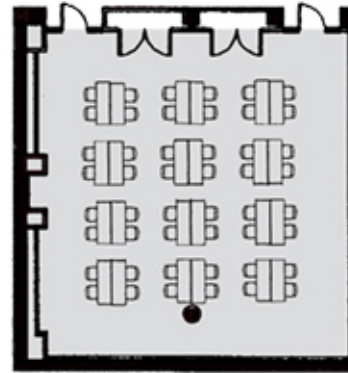
Where does web assisted peer instruction take place today?

The Seminar Room

Design Considerations

Movable furnishings

Portable technologies



Bates College, Maine

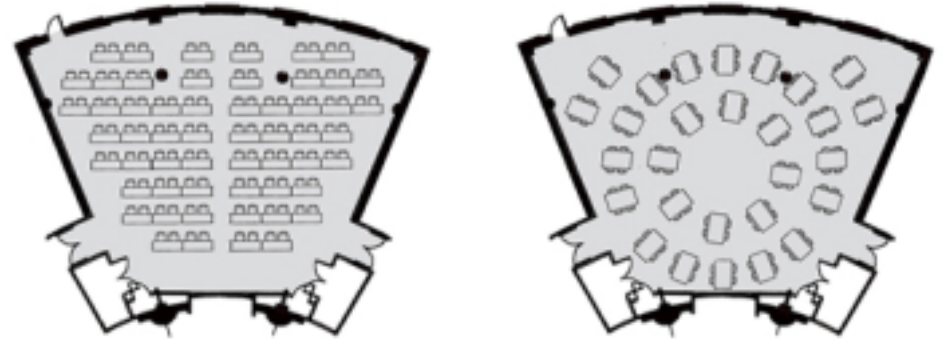
Collaborative Learning Environment

Where does web assisted peer instruction take place today?

The Lecture Hall

Design Considerations

Movable furnishings
Portable technologies



Bates College, Maine



Collaborative Learning Environment

Where does web assisted peer instruction take place today?

The Biology Teaching Lab
Design Considerations

“Plug and Play”

Portable technologies

Boston College, Massachusetts



Collaborative Learning Environment

New places for web assisted peer instruction ?

The 24/7 Computer Commons;

a place where students can share their knowledge of technology, and can do projects together



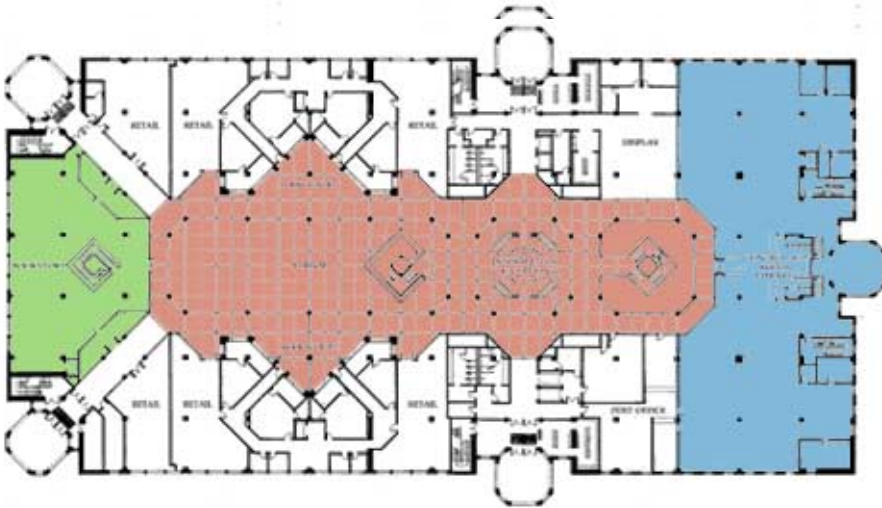
Bates College, Maine
Columbia University, New York



Collaborative Learning Environment

New places for web assisted
peer instruction ?

The University Library and Student Center:
spontaneous group learning in mixed use facilities



George Mason University, Virginia



Collaborative Learning Environment

New places for web assisted
peer instruction ?

The Media Center:

where students use technology as
peers, in multiple groups



Wellesley College, Massachusetts

Collaborative Learning - Classroom Trends

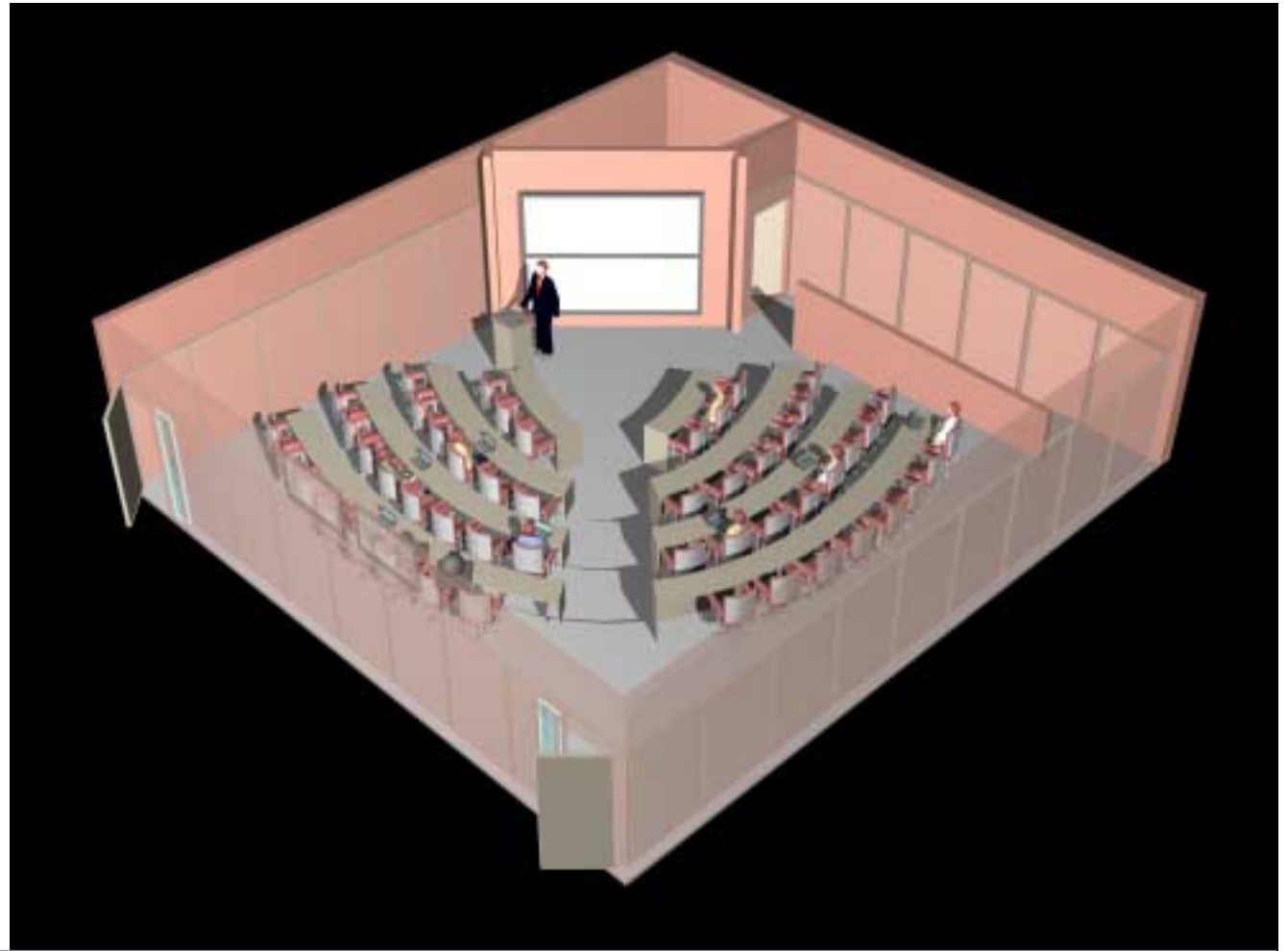


Collaborative Learning

Caseroom

Design Considerations

- 1350sf / 50 seats
- 4 rows / fixed tables / moveable chairs
- Stepped floor / integrated ramp
- Rear screen projection / presentation wall
- Emphasis on student / student and student / presenter interaction
- Capability for distributed learning

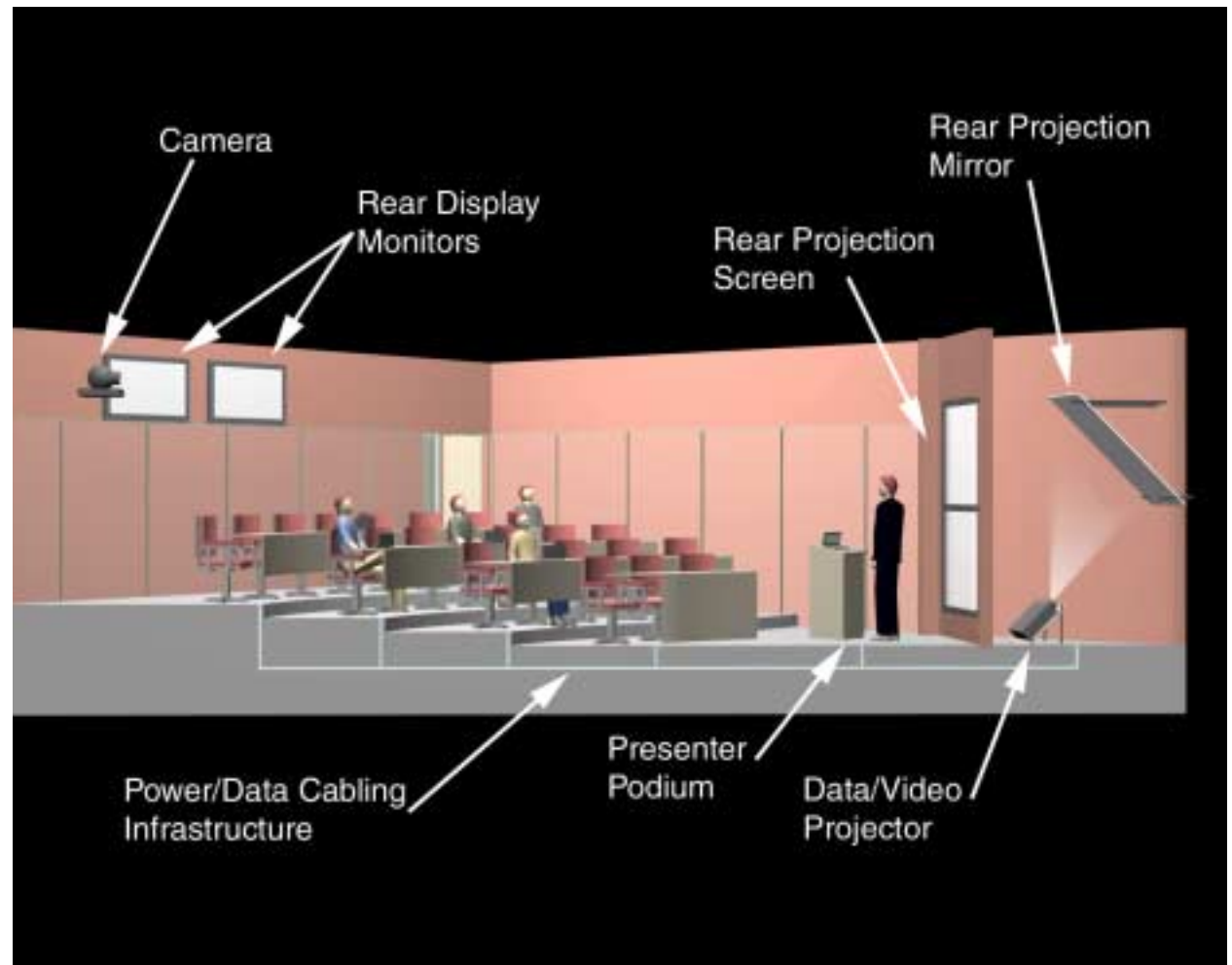


Collaborative Learning

Caseroom

Technology Considerations

- Lighting conflict between presenter & screen
- Noise from HVAC systems
- Provision of power and data cabling to students
- Rear versus front projection



Collaborative Learning



Drucker Graduate Management Center
Claremont Graduate University

Customized Learning Environment

How do people learn?

How is the “*science of learning*” affecting the design of spaces?

Design Considerations

- How technology can help students stay focused and pay attention
 - The acoustic impact of “noisy” information technology
 - The impact of real time interactive sessions in remote locations
 - The building blocks for multiple learning groups.
-

Customized Learning Environment

Using Technology to help students stay focused and pay attention

Three Screen Teaching

Emory College, Georgia



Customized Learning Environment

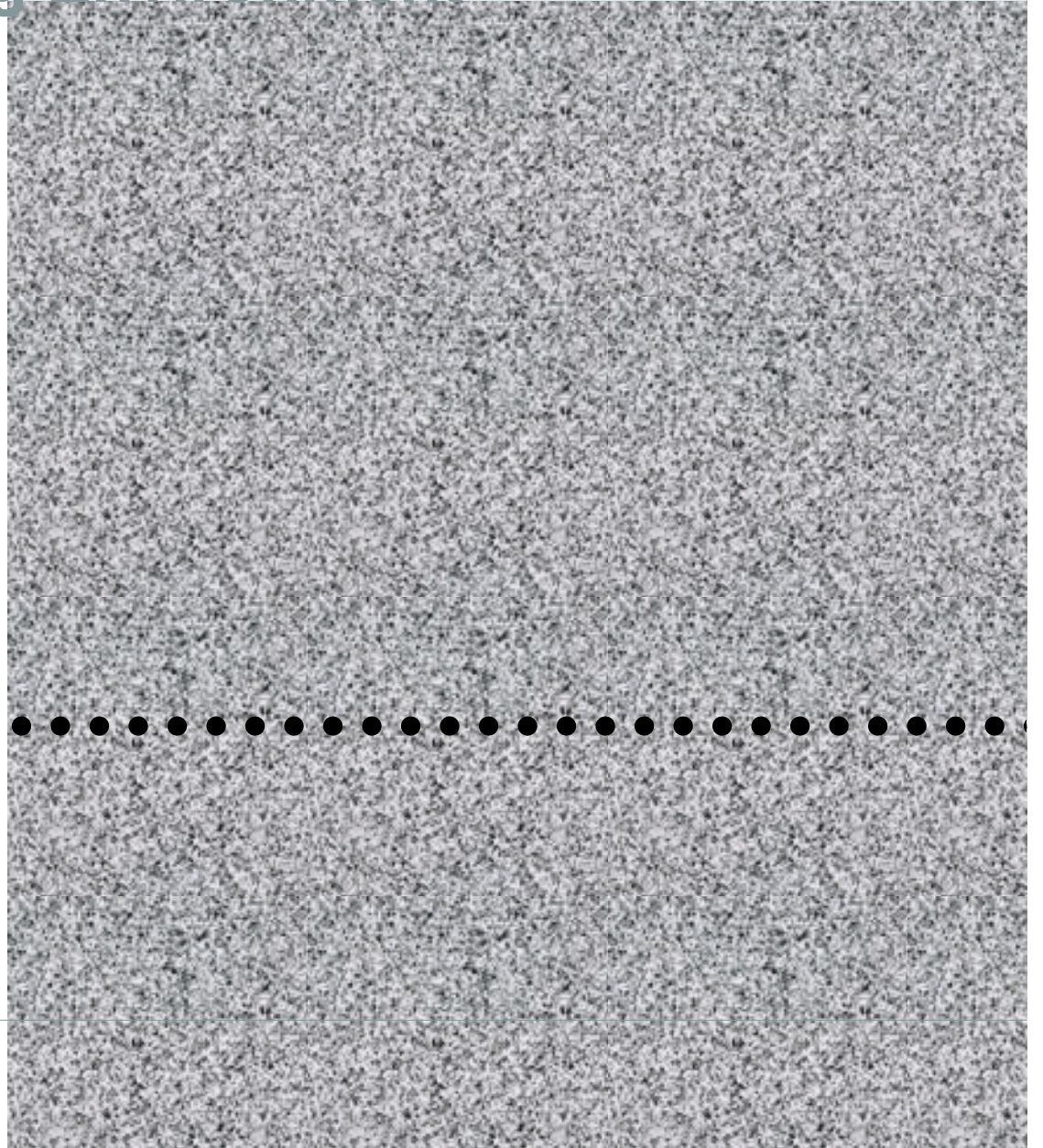
Using technology to help
students stay focused

Design Considerations

W h o o o o s h



White noise



Customized Learning Environment

Seminar Room: The Living Wall

real time interactive sessions in
remote locations



Customized Learning Environment

Using technology to help students stay focused

Design Considerations

Building blocks for multiple learning groups



Wellesley College, Massachusetts

Customized Learning Environment

Using technology to help students stay focused

Design Considerations

Open work area: a building block for multiple learning groups

Wellesley College, Massachusetts



Customized Learning Environment

Using technology to help students stay focused

Design Considerations

The TV studio: a building block for multiple learning groups



Wellesley College, Massachusetts

Customized Learning

Electronic Classroom

Design Considerations

- 1250sf / 24 workstation & central conference
- Multi-venue - perimeter workstations / central conference
- Room adaptability & utilization requirements while maintaining high bandwidth connectivity
- Ability to adapt to evolving curriculum & research requirements

Texas Tech University



Customized Learning



Texas Tech University

Classroom - Furniture Layout 1

Customized Learning



Texas Tech University

Classroom - Furniture Layout 2

Customized Learning



Texas Tech University

Classroom - Furniture Layout 3

Customized Learning

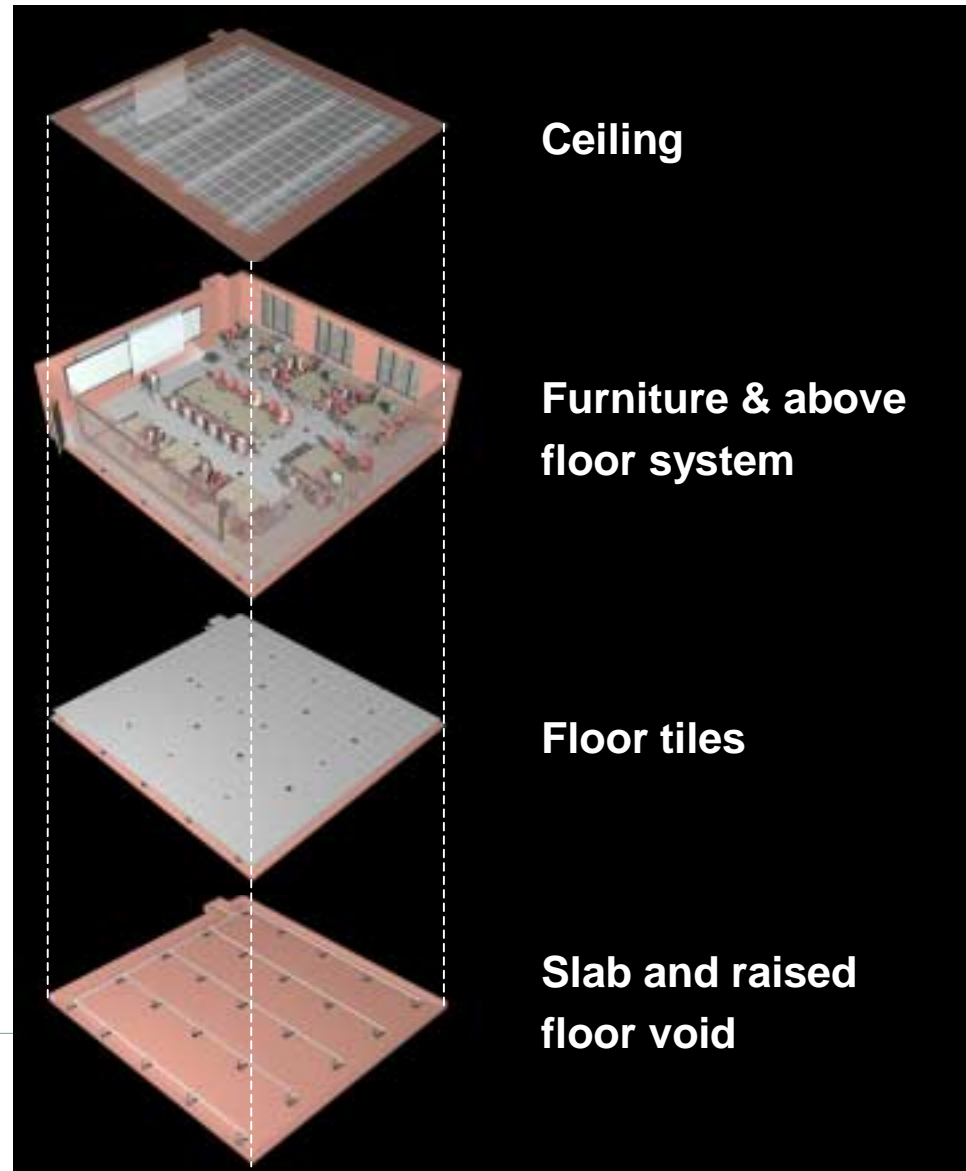
Caseroom Layers

Technology Considerations

Layered Approach Offers :

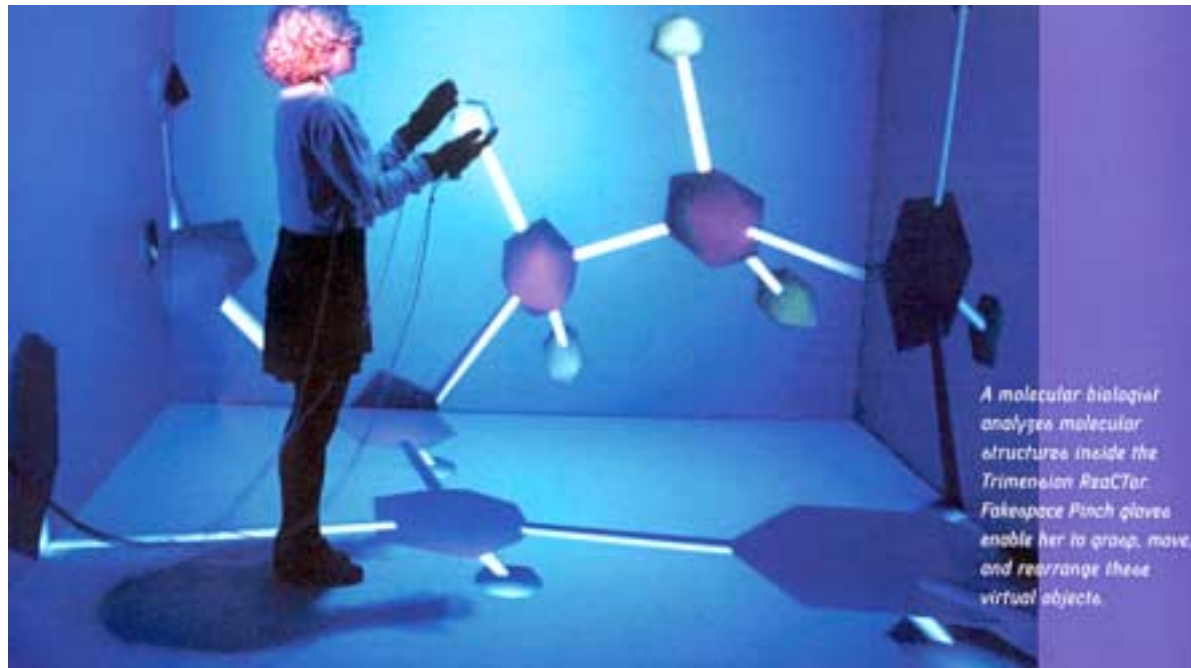
- Maximum flexibility
- Raised floor provision for power & signal flexibility
- Ability to upgrade systems with minimum disruption
- Support for multiple furniture configurations
- Efficiencies in energy costs
- Improved environment

Texas Tech University



Customized Learning

Immersive Learning Environments



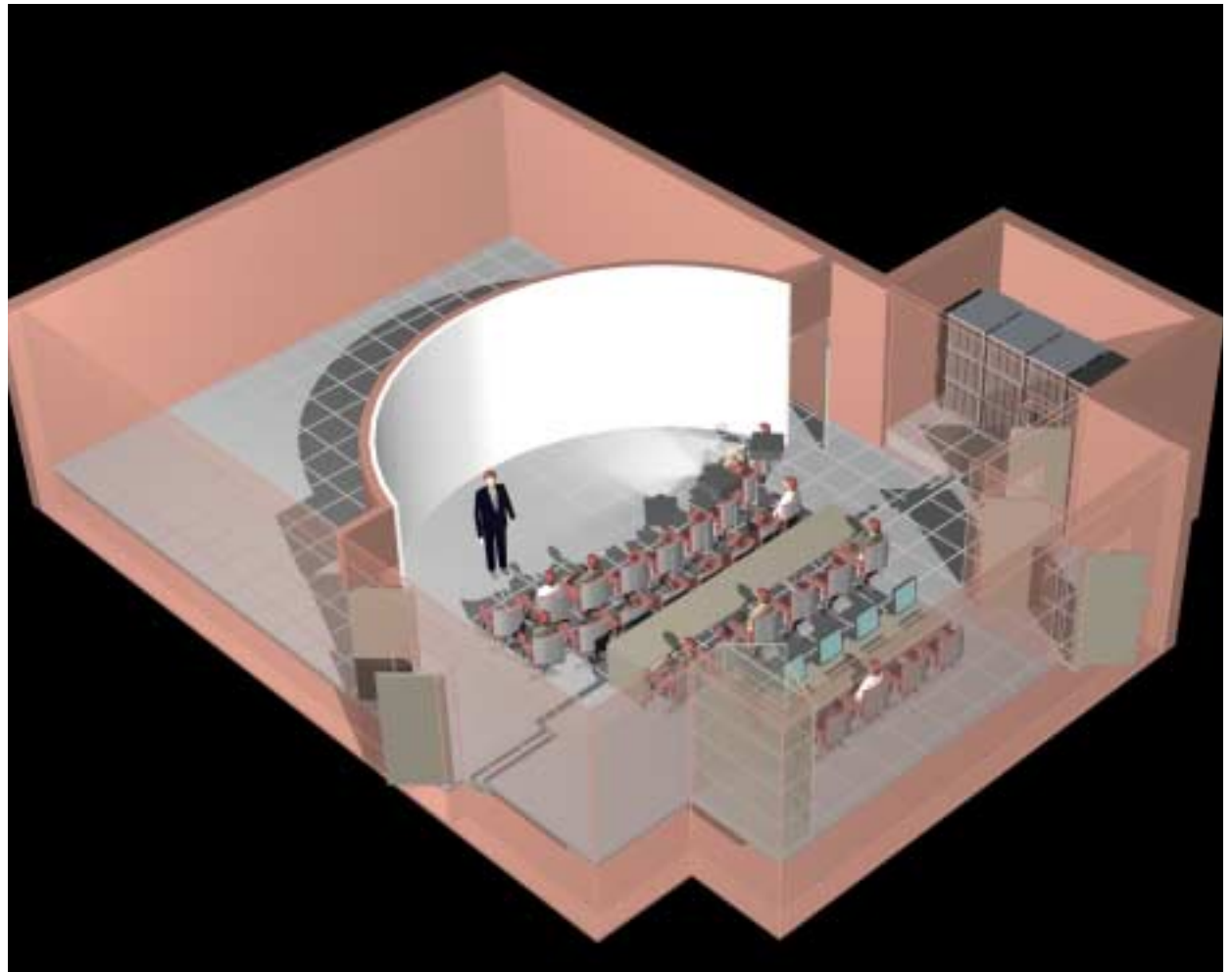
* Photos courtesy of Silicon Graphics, Inc.

Customized Learning

Design Considerations

- 1500sf / 20 seats
- 'Immersion Area' / conference area / computer control area
- Degree of virtual immersion vs. collaboration
- Individual vs. group training
- Hybrids - flat screen to cave
- Establish research interests with software / hardware systems
- Rapid change of technology

Texas Tech University



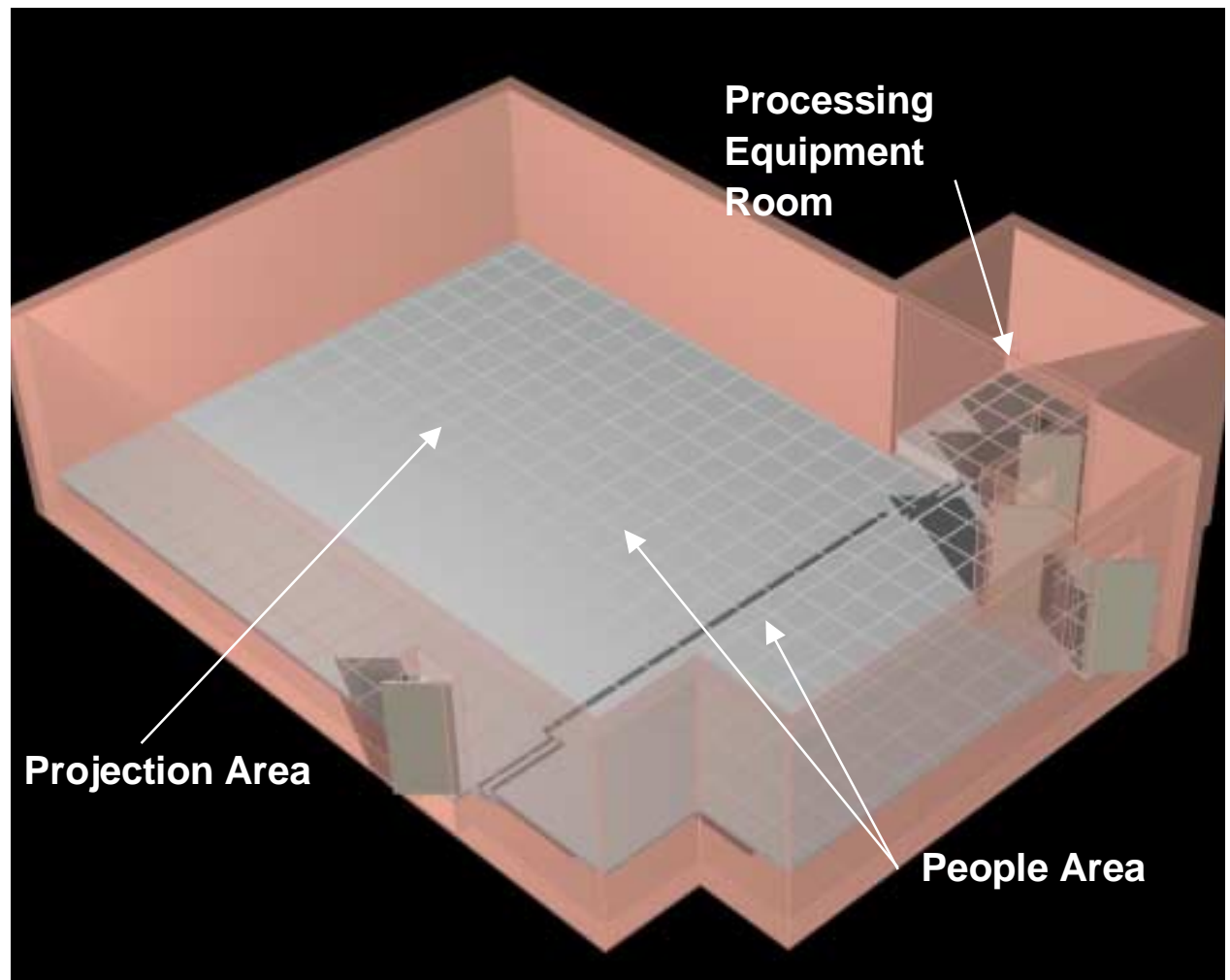
Virtual Reality Center - Curved

Customized Learning

Technology Considerations

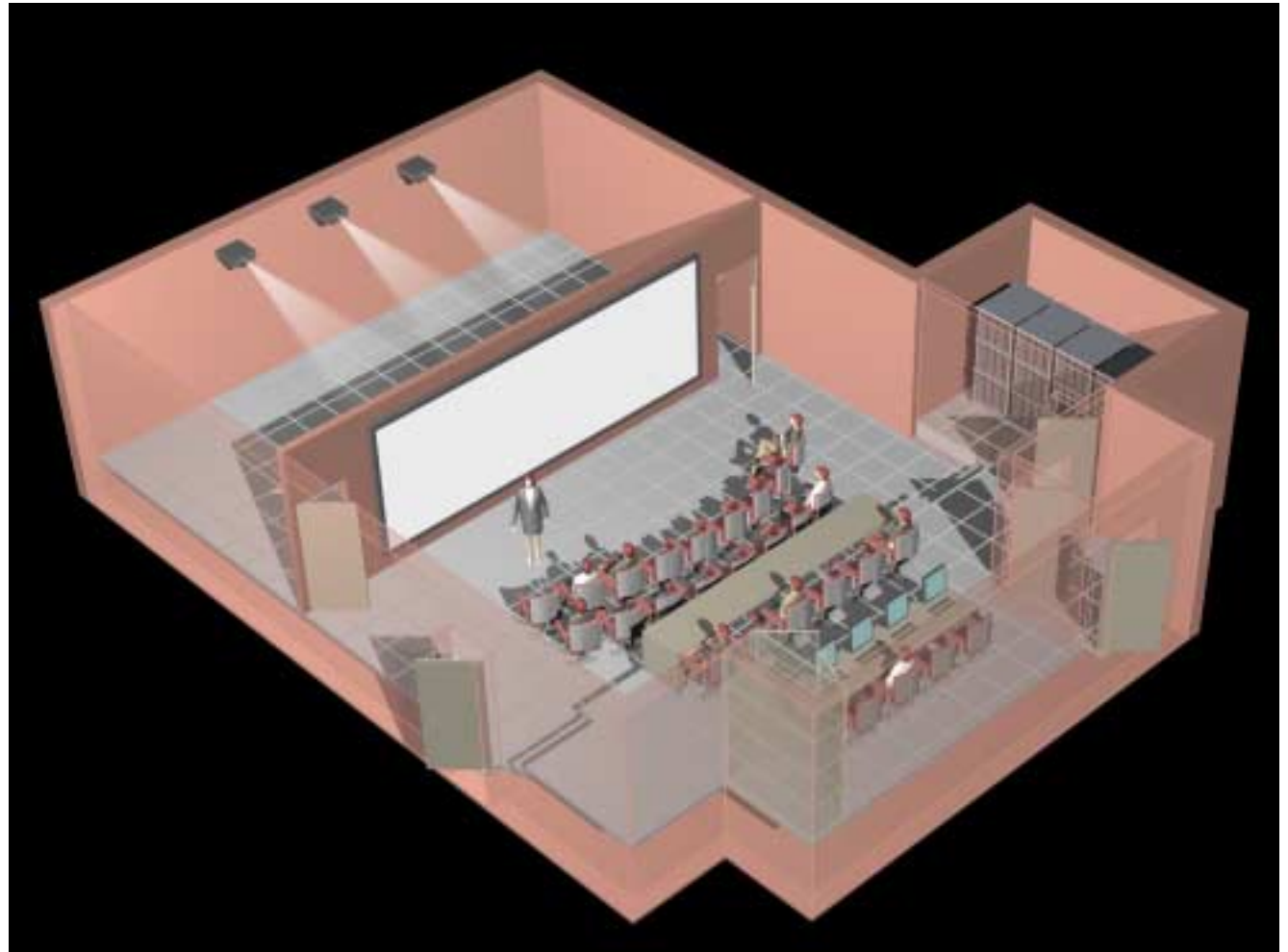
- Double-height shell space to extend 'last possible moment'
- Raised floor provision for power & signal flexibility
- Equipment room adjacent for imaging processign capability
- Multiple viewing areas for differing uses

Texas Tech University



Virtual Reality Center - Shell

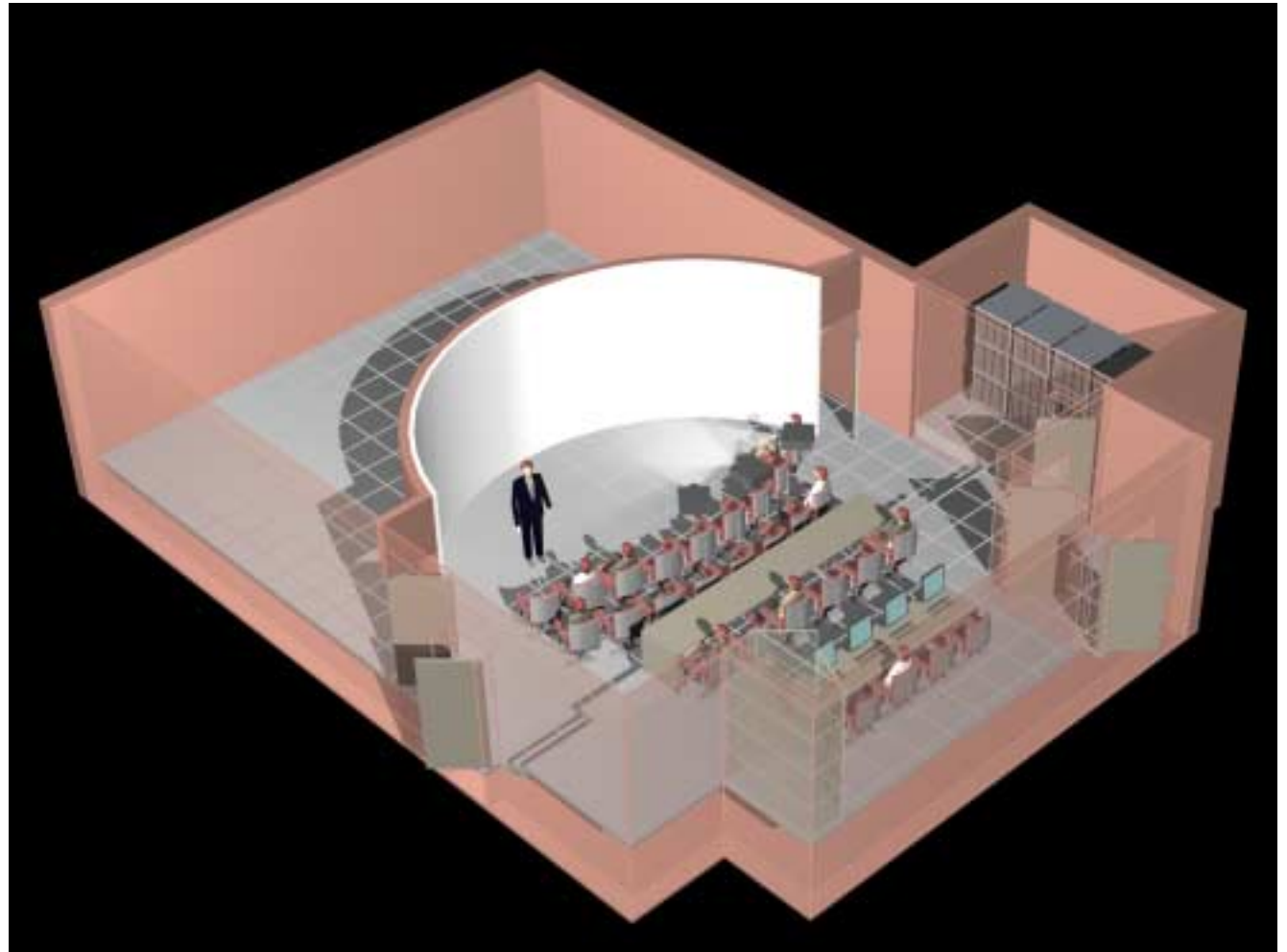
Customized Learning



Texas Tech University

Virtual Reality Center - Flat

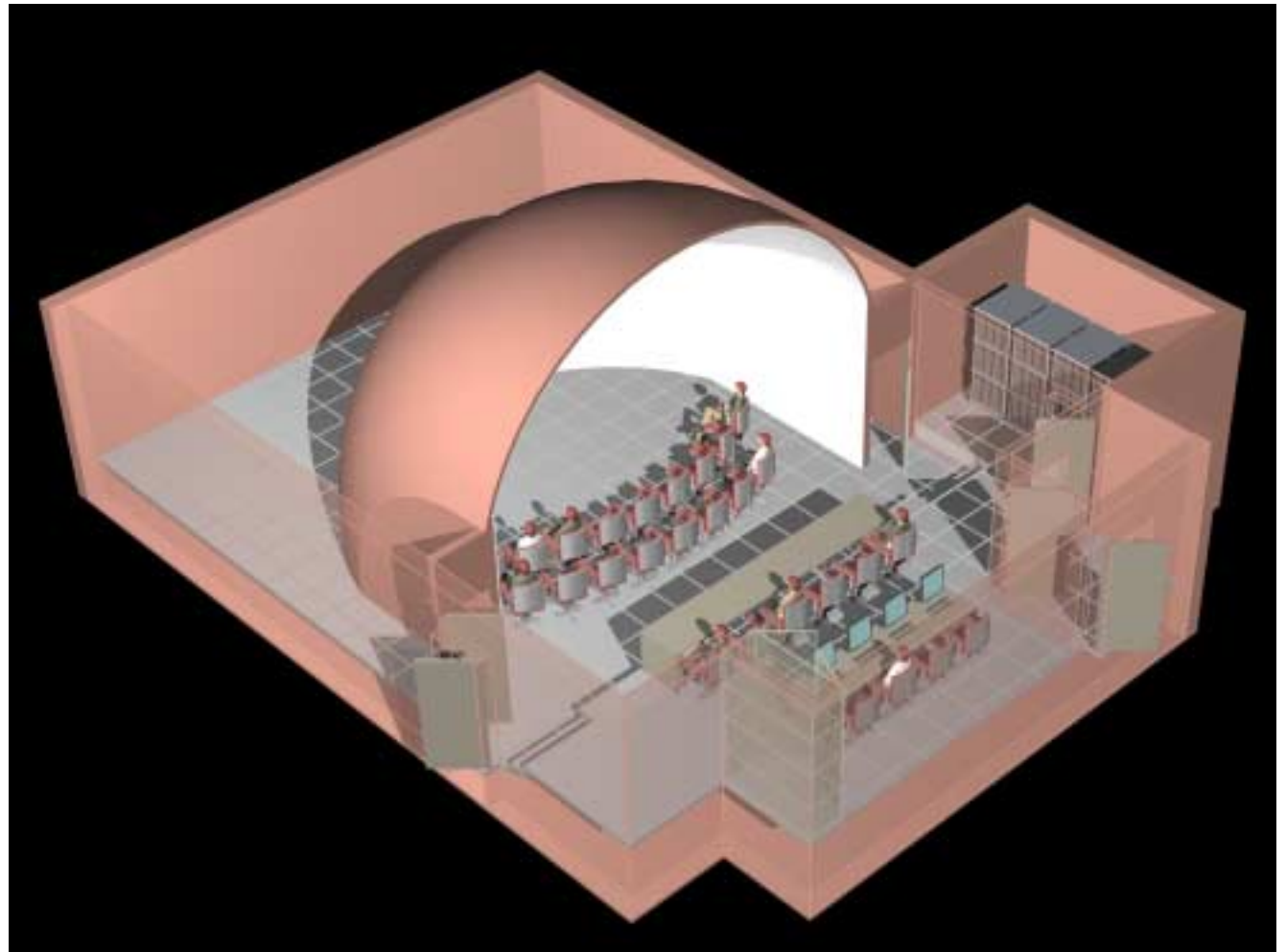
Customized Learning



Texas Tech University

Virtual Reality Center - Curved

Customized Learning



Texas Tech University

Virtual Reality Center - Sphere

Student Centered Learning Environment

Bringing technology to the students

- Consider where student centered learning takes place.
- Consider how technology enhances individualized instruction.



Student Centered Learning Environment

The campus center :

“the social life of information”

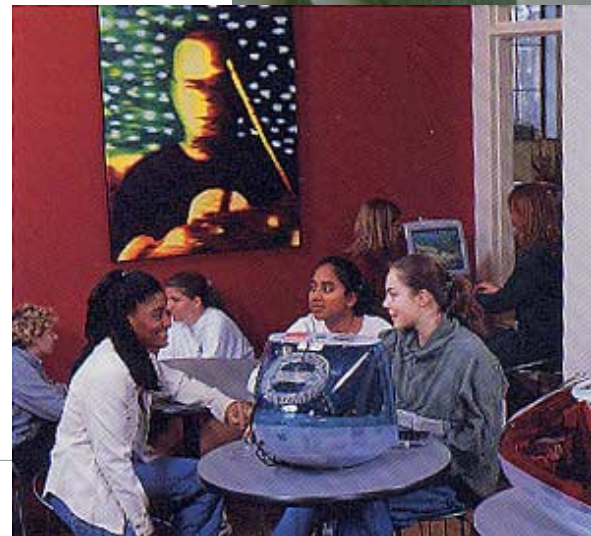
Design Considerations

Using wireless throughout the facility

Mixing social experience with learning



Worcester Polytechnic Institute, Massachusetts
Agnes Scott, Georgia



Student Centered Learning Environment

The Library

Design Considerations

- Minimizing the presence of equipment within existing spaces
- Creating project based places for students



Yale University, Connecticut
Princeton University, New Jersey

Student Centered Learning Environment

The Laboratory

Design Considerations

- Minimizing the presence of equipment
- Creating project based places for students



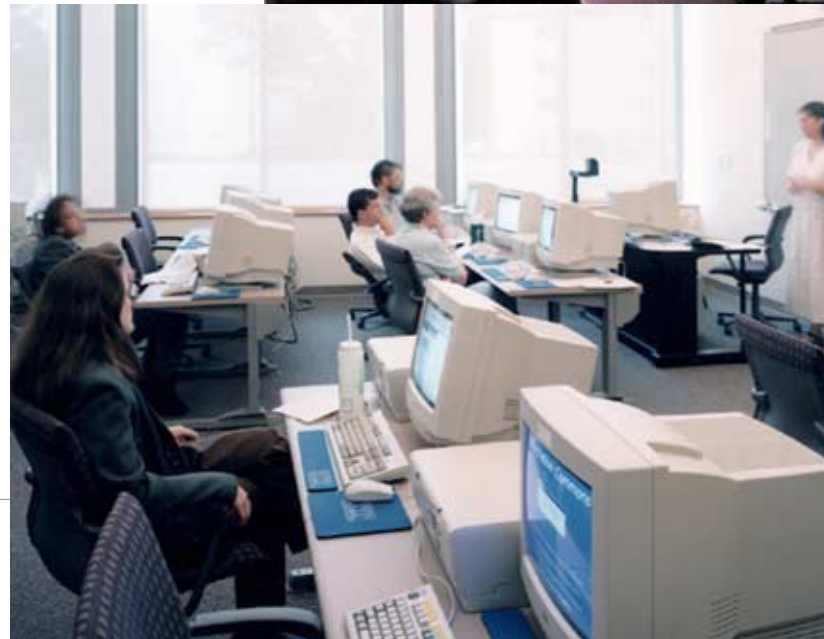
Boston College, Massachusetts

Student Centered Learning Environment

The Classroom

Design Considerations

Strengthen the relationship between teacher and student



University of Rochester, New York
Emory College, Georgia

Student Centered Learning Environment

Bringing technology to the student?

Summary:

- Consider a variety of levels of technology, based on the cost to the student, and the kind of information/pedagogy requirements.
- Consider programming spaces to include wireless laptop technology, wired technology for some classrooms, and specialized computer and AV labs for complex teaching and research activities.



Student Centered Learning

Medical Education

- Fewer lectures, more small group experiences
- Integration of basic sciences with clinical
- Individualized instruction
- Training in how teams function in multi-disciplinary environments



University of New Mexico

Student Centered Learning

Simulator Patient Training

- Computerized mannequins
- Clinical skills procedure rooms
- Debriefing & feedback protocols



Clinical Skills Environment

- [illegible]



Student Centered Learning

Clinical Performance Center

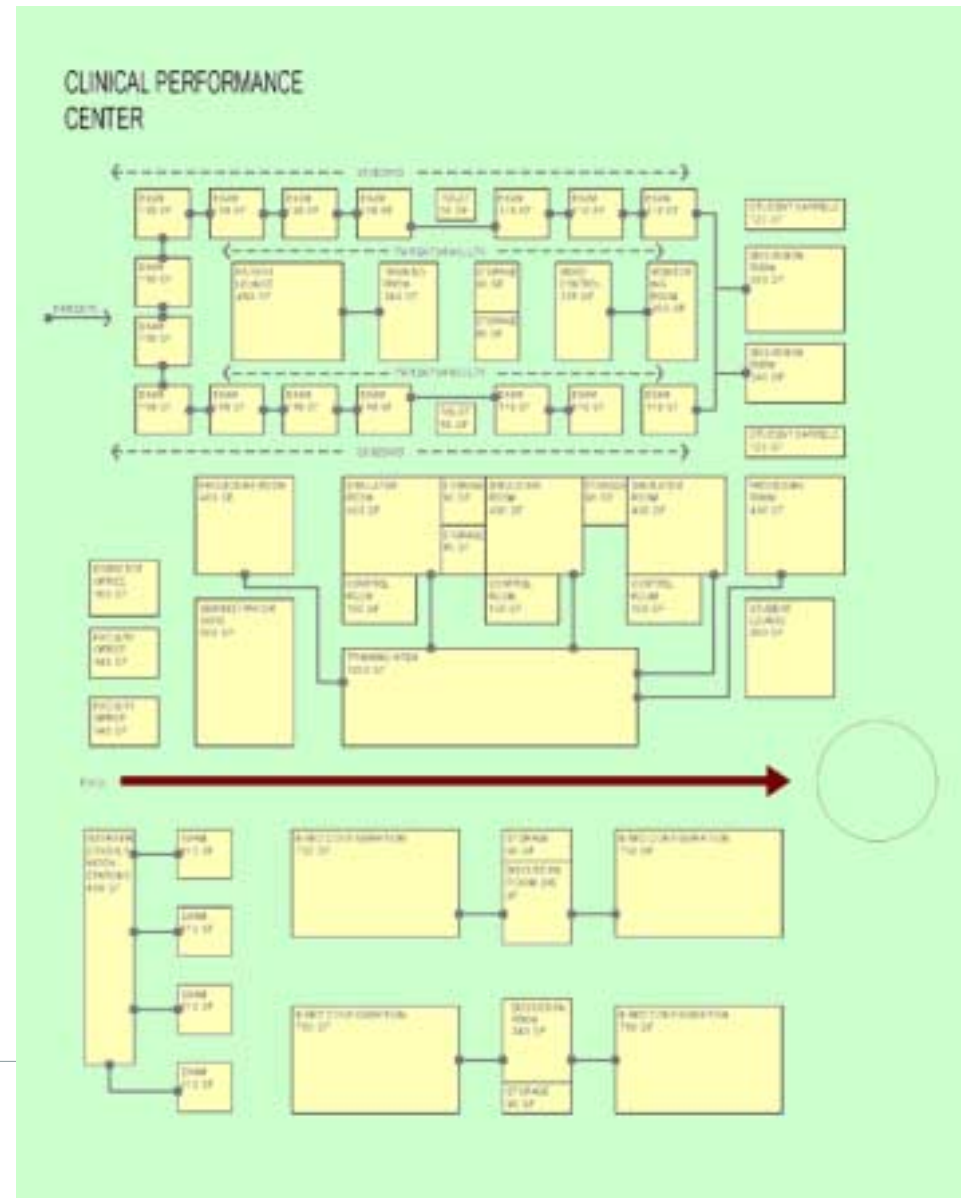
Clinical Skills Lab

- Patient Examining
- In-Patient Beds
- Procedure Rooms
- Pharmacy Interview / Consultation

Simulator Patient Training Area

- Computerized Mannequins

Debriefing and Assessment Rooms Monitoring & Video Technology



Student Centered Learning

Student Ammenities



University of Iowa



THE IMPACT OF TECHNOLOGY ON LEARNING ENVIRONMENTS

ANSHEN+ALLEN+LA

SHEPLEY BULFINCH RICHARDSON AND ABBOTT

Technology Design Timetable

